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long, generally with four to nine or ten spikes. Some spikes get no farther than the floral stage. On others from three to six nutlets ripen, part of the flowers on them being aborted. One stem with eleven spikes in various stages of development had seven with perfect fruit, though not fully grown in all, aggregating about twenty-five nutlets. The largest number on a single spike is six. The spikes are 2-3<sup>cm</sup> long, on slender diverging or erect-spreading grooved and angled peduncles, which are 3-7<sup>cm</sup> (mostly 3-4<sup>cm</sup>) long. The nutlets are 3-4<sup>mm</sup> long by 2.5-3<sup>mm</sup> wide. They are brown to reddish-brown in color, the surface minutely roughened under a lens. They are three-keeled on the back, the prominent middle keel having a thin, sharp, slightly angled margin. There is a shallow central depression on each side, circular, or a little elongated longitudinally, with a diameter about one-third that of the body of the nutlet. The plants grew in shallow water, the upper parts of the inflorescence usually protruding above the surface. I am indebted to Mrs. Agnes Chase of Chicago for the drawings, which faithfully represent the specimens.—E. J. HILL, *Chicago*.

#### EXPLANATION OF PLATE XV.

FIG. 1. Upper portion of a fruiting stem, natural size.

FIG. 2. Fruit enlarged ten diameters.

FIG. 3. Section of fruit, showing embryo, enlarged ten diameters.

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#### WYOMING JUNIPERS.

THE junipers of Wyoming, while not numerous, are interesting. Until recently these have been assumed to be all of one species, *Juniperus Virginiana* L. The common Rocky mountain form of this has recently been segregated by Dr. C. S. Sargent under the name of *J. scopulorum*. This species seems to require two years to mature its fruit, this fact being one of the points upon which, as I believe, this good species is founded.

Some other species of Rocky mountain juniper were known to be common in neighboring states, *J. occidentalis* Hook. to the northwest, *J. Californica Utahensis* Eng. to the west, and *J. occidentalis monosperma* Eng. to the south. That one or more of these may yet be found within the borders of this state is quite probable; in fact, when during 1897 a

form common in the hills of the Red Desert was secured it was assumed to be one of the above-mentioned well-known species. In trying to name the specimens, however, it soon became evident that none of the extant descriptions would apply. To make sure that such was the case I secured from other localities material of closely allied forms, more

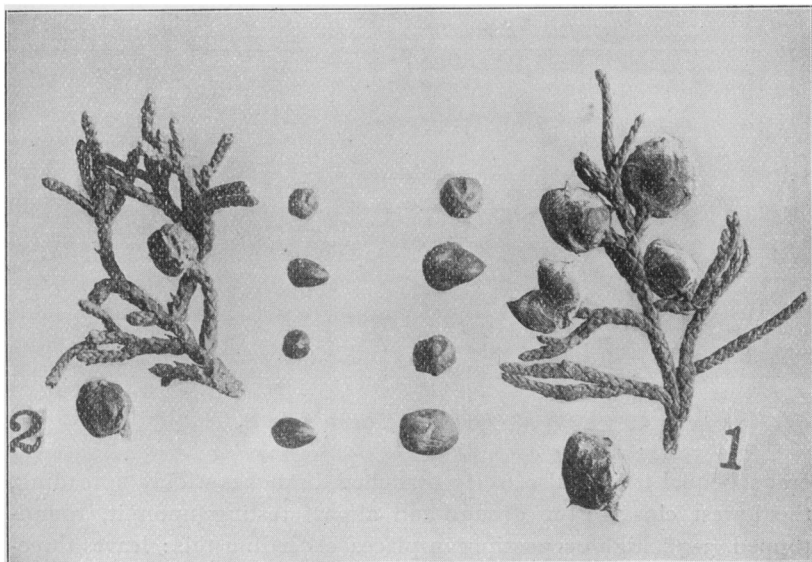


FIG. 1.—*Juniperus Knighti* Aven N. (1) and *J. Californica Utahensis* Engelm. (2).

especially *J. occidentalis monosperma* and *J. Californica Utahensis*.<sup>2</sup> The specimens agreed no better than the descriptions. *J. occidentalis monosperma* was excluded at once by its fleshy berry and small pointed seed. The new form was likewise to be distinguished from *J. Californica Utahensis* by difference in color, size, and shape of berry and especially by the seeds; also by the larger, plumper leaves. These differences are more or less well shown in the accompanying cut, where a bit of twig, some berries and seeds of the two are similarly placed and photographed (enlarged) on one plate as nos. 1 and 2 respectively.

The new form (no. 1) has not only the larger seed, but its obtuse

<sup>2</sup>For specimens and loan of specimens I am indebted to Messrs. T. S. Brandegee, J. G. Lemmon, and C. V. Piper.

only slightly grooved apex and its rounded swollen base will distinguish it from the other with its smaller, acute, brown-tipped seeds. Since it does not seem possible to place this with any of the already described forms, it may be named and characterized as follows:

**Juniperus Knighti**, n. sp.—A scraggy shrub or small tree, usually much branched from the base, *i. e.*, trunkless or breaking up into sev-

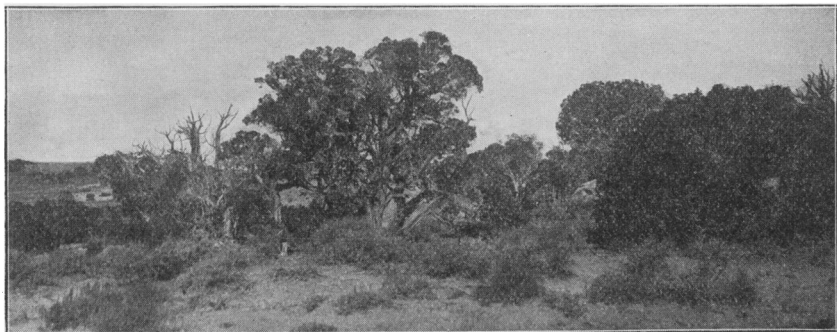


FIG. 2.—*Juniperus Knighti* Aven N.

eral subequal trunks also freely branched, branches widely spreading, the lowest close to the ground and almost resting upon it, round-topped, 3–7<sup>m</sup> high or possibly in places exceeding this: leaves three-ranked, closely appressed, of rhomboidal outline, subacute, about 1<sup>mm</sup> wide, nearly twice as long, thick, sometimes slightly depressed on the dorsum, entire or rarely minutely denticulate, neither pitted nor glandular, persisting in part on the branches of old trees as dead somewhat acute or acuminate scales, branches of young trees almost smooth or with a few long-acuminate scattered scales with usually a whorl of the same at the base of the branchlets; the branches divaricate but not squarrose: peduncle or fruiting branchlet short and thick: berry-like cones blue-green or copper colored (all distinctly copper colored if boiled), distinctly marked on the surface by the apices of their several scales, broadly oval, 7–10<sup>mm</sup> long, dry, the coalesced scales thin, in dried specimens closely and tenaciously adherent to the large single seed: seed ovate, obtuse, slightly grooved above, rounded or swollen at the base: fruit possibly not maturing till the second year. —Type specimen, Herb. Univ. of Wyo., no. 3096, Point of Rocks, June 1, 1897.

It is with pleasure that I dedicate this species to Professor W. C. Knight, geologist and palæontologist and whilom botanist, to whom I am often indebted for specimens, and who first called my attention to this form.

This shrub-like tree is common in the so-called cedar bluffs, red sandstone hills, occurring at intervals throughout the Red Desert region of Wyoming from the Seminoe mountains to Green river. It was observed by the writer in numerous localities during the summer of 1897, the accompanying figure being from a photograph secured at Point of Rocks. The habit as shown is not only characteristic but nearly universal. One is reminded of the recently published illustration of Dr. Sargent's *J. scopulorum*,<sup>3</sup> which is scarcely characteristic of that species as I know it in the hills about Laramie.

The two foregoing are the only tree-like junipers that have yet been secured in the state, but one or two others may possibly be found within our borders to the west and north. Of the shrubby forms the following are abundant: *J. communis* L., *J. communis Sibirica* (Burgsd.) Rydb., and *J. Sabina* L.—AVEN NELSON, *The University of Wyoming*.

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#### THE MORPHOLOGICAL SIGNIFICANCE OF THE LODICULES OF GRASSES.<sup>4</sup>

THE question of the morphological significance of the lodicules in the grasses has been discussed by very many botanists during the last hundred years. The last author, of which I know, to deal directly with the subject was Dr. Edward Hackel, the eminent agrostologist, who in his paper published in the first volume of Engler's *Botanische Jahrbücher* (1880), treats the question so exhaustively that his conclusions, supported as they are by his careful researches and to some extent no doubt by his great reputation as a student of the grasses, have for more than twenty-five years been accepted as the true interpretation of these organs. A glance at his historical résumé shows that, in the main, two views have been held by botanists: first, that these organs constitute a rudimentary perianth, to which view a considerable number, especially of the older botanists, gave adherence; and second, that they are remnants of bracts in morphological value the equivalent of leaves. To the latter view Hackel, as well as other earlier writers, held.

<sup>3</sup> Garden and Forest 10: 423. 1897.

<sup>4</sup> Read at the Ithaca meeting of the Society for Plant Morphology and Physiology.